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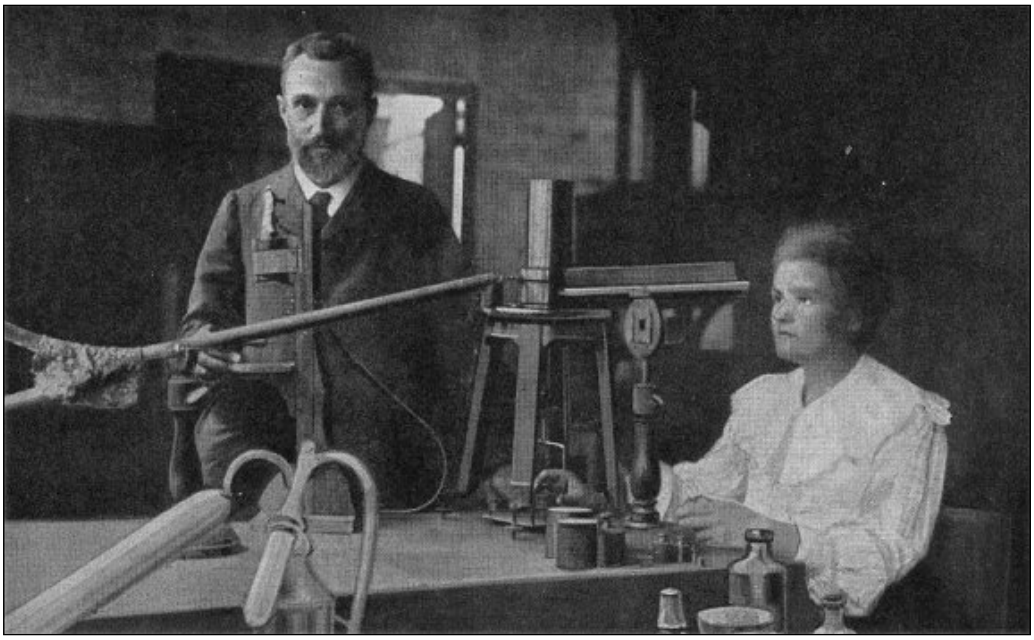
Educating the Mass Strike: Cosmic Radiation beats Green Fascism

Pierre and Madame Curie

By Gabrielle Peut Part 3 of 4



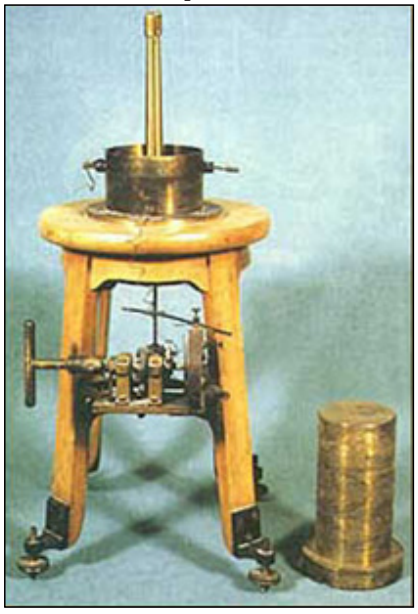
Marie and Pierre in the Lab.

Pierre Curie was sure that this was an expression of a fundamental principle. His investigations into the relationship between the *physical* properties (that is, thermal, electric and magnetic properties) and the *symmetry* properties of crystals led him to put forward the idea that there could exist different "states of space," in which symmetry or dissymmetry prevailed. This idea became a new scientific platform for the work of Vladimir Vernadsky.

When Marie and Pierre read Henri Becquerel's French Academy of Sciences paper on his discovery that Roentgen's mysterious X-rays (which he then called Becquerel Rays) could penetrate solid wood or flesh, and yield photographs of living people's bones, and that they seemed to be derived from a uranium compound, they were immediately curious and keen to investigate.

Becquerel had found that the radiation emitted from the uranium ore caused the air in its vicinity to conduct electricity. He concluded that the energetic emission was coming from the minerals with a higher proportion of uranium, but it was not known what caused the uranium to do this.

Marie hypothesized that the emission of rays by uranium compounds could be an atomic property of the element uranium – something built into the very structure of its atom.



Pierre's Electrometer.

With numerous experiments, she confirmed Becquerel's observations that the electrical effects of uranium rays were constant, regardless of what form the uranium mineral was in. It didn't matter whether it was pulverized, pure, wet, dry, or exposed to heat or light: the rays were constant. Likewise, she validated Becquerel's conclusion that the minerals with a higher proportion of uranium emitted the most intense rays.

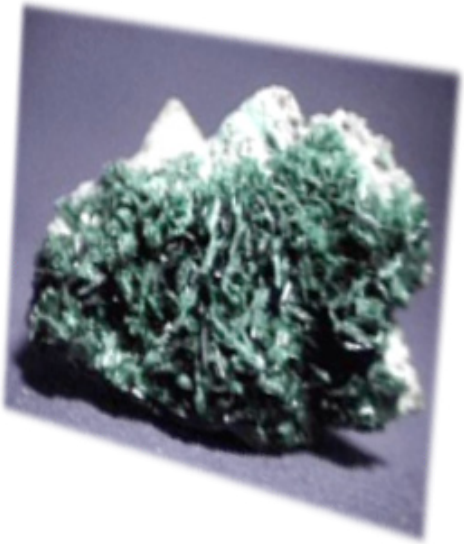
Marie conceived the idea of applying the device that Pierre had invented 15 years earlier, known as *Pierre's Electrometer*. She hypothesized, that *"Instead of making these bodies act upon photographic plates, I preferred to determine the intensity of their radiation by measuring the conductivity of the air exposed to the action of the rays."*

Marie got Pierre to develop a new kind of electrometer that could measure the smallest of electric charges in the air. When uranium emits radiation, that radiation strikes air molecules and breaks them apart, causing small charged particles called ions to appear. This is called ionization, and Pierre's new machine could measure these electric charges.

Marie's hypothesis, that the emission of rays from uranium compounds could be caused by an atomic property of the element uranium, proved revolutionary. It would ultimately contribute to a fundamental shift in the scientific understanding of energy, matter, and space, and bring about the birth of nuclear physics. Marie called this discovery *radioactivity*.

This was the year 1896. Marie and Pierre's next step was to discover if there were other elements in the Periodic Table possessing the same property of radioactivity. She begged at as many laboratories as she could, to secure all the known elements at that time. She and Pierre undertook the enormous task of looking for radioactivity in all the metals, metallic compounds, salts, and minerals they could get their hands on. This investigation constituted some of the substance of "physical chemistry," which superseded the fields of "physics",

Pitcheblende and Chalcolite.



and especially "mathematical physics".

Using the electrometer, they found that two known elements, uranium and thorium, were radioactive. After several weeks, Marie was thrilled to find that *"the emission of rays by compounds of uranium is a property of the metal itself – that it is an atomic property of the element uranium independent of the chemical or physical state."* She had confirmed her hypothesis.

They then experimented with two uranium ores, pitchblende (now also called uraninite) and chalcolite (a copper ore mineral), and came up against a paradox.

Using *Pierre's Electrometer*, Marie determined that in the case of pitchblende, which was devoid of uranium, (they removed the uranium chemically) the electrical charge in the surrounding air that the electrometer was measuring, was four times greater than the uranium alone, and the radioactivity of chalcolite was twice as great. How could this be possible, since there was no uranium or thorium present in the pitchblende?

In her own notes Marie says: "This fact is quite remarkable and suggests that these minerals may contain an element much more active that uranium (itself)".

Marie once again hypothesized, that there must have been very small quantities of extremely radioactive elements in the pitchblende and chalcolite, and she then proceeded to isolate these elements.

Getting her hands on more Pitchblende, Marie invented new methods of chemical analysis in order to separate out each new element. As she did so, repeatedly, she then measured the element on the electrometer to determine its radioactivity. The chemical elements, oxides, and metals, such as lead, Bismuth, Arsenic, and luminance, all had to be separated. Marie ground pitchblende into powder, dissolved it in acid, and went through the almost endless, repetitive task of separating its elements. Finally she excluded every element except bismuth, to which she added hydrogen sulphide. The chemical reaction produced a solid that she tested for its radioactivity. It was Marie's Eureka! In her notebook and underlined 150 times more active than uranium.

By June of 1898, they had separated a substance with 300 times the radioactivity of uranium. They named this new element *polonium*, after Marie's embattled homeland. By December that same year, they had isolated another product from the ores, which they identified as the element *radium*. The Curies now dedicated themselves to obtaining pure samples of these new elements, which took four years of dedicated labour, working in an unheated shed behind the *University of Paris.*

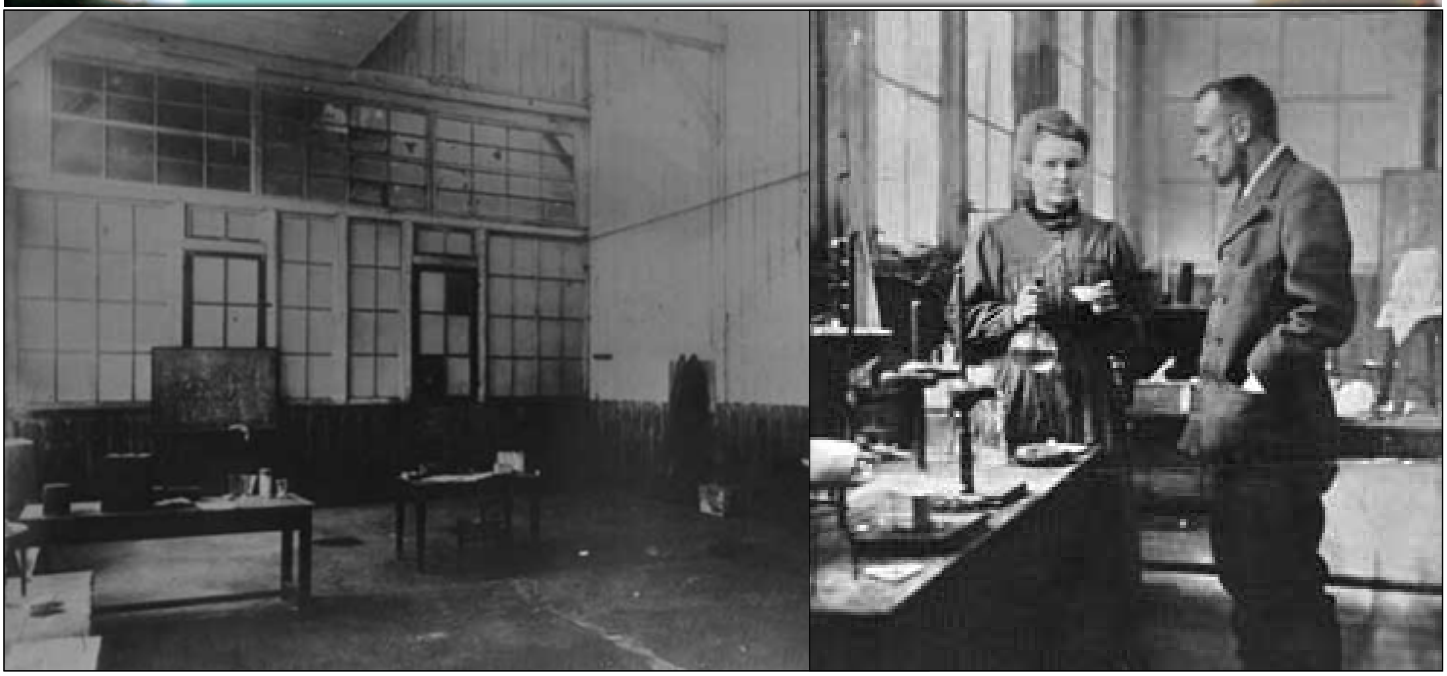
The Laboratory: For your benefit here's and inside view of the conditions that the Curies worked in. The laboratory was in the courtyard of the School of Physics and Chemistry, was described by one visiting scientist as "a cross between a stable and a potato-cellar."

The discovery of these new elements was just the beginning of their work. They also confirmed Becquerel's earlier indications that there was more than one type of radiation coming from the radioactive substances. Additionally, in the course of separating the radioactive elements of polonium and radium, Marie and Pierre made the remarkable discovery that one element could be transformed into another.

After the announcement of the second element, radium, in December of 1898, Pierre was promoted to Professor in the Faculty of Science and they produced a detailed report on *Radioactive Substances* for the International Congress of Physics, part of an international exhibition in Paris in August 1900. It attracted tens of thousands of visitors, one of them being the infamous Lord Kelvin.

In 1901 the Curies wrote a joint paper "*On Induced Radioactivity and the Gas Activated by Radium*". Pierre showed that this gas was largely responsible for radium's intense radiation. In their report the Curies highlighted the still perplexing

The Cow Sheds



Pierre and Marie Curie at the Cow Sheds.

nature of radioactivity, which not only seemed to violate the First Law of Thermodynamics, i.e., that energy can be converted from one form to another but cannot be created or destroyed, while radium just emitted energy without seeming to undergo any change. Now, this was a shocking statement that they made to the scientific world!

Their work of stripping out radium from pitchblende intensified. From one ton of pitchblende, they were able to separate out one-tenth of a gram of radium chloride. Pierre and Marie were astonished at the minute amount of extremely powerful radioactive radium they were left with. The hazards of this process included the release of what later became known as radioactive radon gas, which contaminated their laboratory at times and played havoc with their equipment as well as their health.

Early in 1902 the Curies received a grant of 20,000 francs from the French Academy of Sciences. This allowed them to buy more pitchblende residue, from which they hoped to produce enough pure radium to accurately estimate its atomic weight. With just over one-tenth of a gram, Marie had enough to be able calculate the atomic weight as 225.93, remarkably close to the 226 on today's listing for radium in the Periodic Table of Elements.

The Curies announced their discoveries internationally. They could have derived enormous wealth from them, but they declared that they would not patent the process of producing radium. They were never interested in fame or fortune, but only in contributing the products of their creativity as a gift to the world.

After much debate, in November 1903 Marie and Pierre Curie, together with Henri Becquerel, were awarded the Nobel Prize for Physics. Even though Marie was the first woman ever to receive a Nobel Prize, she and Pierre were not that moved by it, and saw the award as a massive distraction from their scientific work.

The impact of their work was global. French institutions responded by appointing Pierre as Professor of Physics at the Sorbonne in 1904. The next year he was elected a member of the French Academy of Sciences. He wasn't greatly thrilled about that, basically because of the culture of company manners existing academica.

The January 1904 issue of *American Century Magazine* captured the impact and excitement of the Curies' work, when they published an excerpt from Marie's paper on radium and radioactivity. The article began:

"The discovery of the phenomena of radioactivity adds a new group to the great number of invisible radiations now known, and once more ***we are forced to recognize how limited is our direct perception of the world which surrounds us****, and how numerous and varied may be the phenomena which we pass without a suspicion of their existence until the day when a fortunate hazard reveals them.…[Electromagnetic radiations] … are present in the space around us whenever an electric phenomenon is produced, especially a lightning discharge. Their presence may be established by the use of special apparatus, and* ***here again the testimony of our senses appears only in an indirect manner.*** *If we assume that radium contains a supply of energy which it gives out little by little, we are led to believe that this body does not remain unchanged, as it appears to, but that it undergoes an extremely slow change. Several reasons speak in favor of this view. First, the emission of heat, which makes it seem probable that a chemical reaction is taking place in the radium. But this is no ordinary chemical reaction, affecting the combination of atoms in the molecule. No chemical reaction can explain the emission of heat due to radium. Furthermore, radioactivity is a property of the atom of radium; if, then, it is due to a transformation, this transformation must take place in the atom itself. Consequently, from this point of view, the atom of radium would be in a process of evolution, and we should be forced to abandon the theory of the invariability of atoms, which is the foundation of modern chemistry".*

What a bombshell Marie just announced! In the years following 1898, and then continuing after Pierre's death in 1906, Marie found that radium produced significant amounts of heat, amounting each year to the equivalent of burning 100 times its weight in coal. It also seemed to continue, year after year, with no sensible decrease. And this is where Marie surmised that this radioactivity was connected with a process of atomic transformation that somehow underlay the close association of radium and polonium with uranium and certain other substances, always found together in uranium minerals; and that the radium was very slowly transforming itself

into one or another element. Further research confirmed her hypothesis, and that in fact radium was very slowly transforming itself into lead!

The prevailing theory of the nature and structure of the atom and Newton's hard ball'd universe was destroyed. With this announcement and her unprecedented Nobel prize, which ruffled many feathers in the chauvinistic world of science, there was a gathering of forces, mainly coming from Britain, building an hysterical fear of radiation which is still pandemic in the world today.

The scare-mongering that spread through the press and within the scientific community revolved around the medical use of radium, which Pierre had identified earlier could be used for the treatment of lupus, cancer and so forth. Charlatans overdosing patients with radium for monetary gain was one of many abuses that occurred.

The most profound importance of the discovery of the radioactive elements was the Promethean idea it delivered to the world, which had the power to transform nations. Paul Langevin, a former student of Pierre's, said some forty years after the discovery, that *"It may have an importance for the future of civilization, comparable to that which allowed man to discover the power of fire".*

The British set out to destroy the cultural optimism that this new discovery had unleashed, as well as the revolutionary scientific principles that had made the creative discovery possible. As discussed in previous presentations, Darwin's Bulldog T H Huxley, the mentor of H G Wells the eugenicist, and Lord Bertrand Russell, were at the center of running the terror campaigns against the development of nuclear energy.

Wells wrote over 60 books on virtually the same subject: a world civilization destroyed by catastrophe or war, and a "war to end all wars". By 1913 he was incorporating "atomic bombs" into his writings, as the method of the destruction of world civilization. Brandishing the spectre of atomic destruction, Wells wanted to terrify nations into submission and surrender to World Government, rather than fight any wars in defense of national sovereignty. Wells claimed that he got the inspiration after reading Fredrick Soddy, a respected chemist of the day, but who was also a raving alchemist. Soddy, a Nobel Prize winner in Chemistry in 1915, published a number of papers on the potential of nuclear fission. Soddy exclaimed: *"If it could be tapped and controlled, what an agent it would be in shaping the world's destiny! The man who puts his hand on the lever by which a parsimonious nature regulates so jealously, the output of this store of energy would possess a weapon by which he could destroy the Earth if he chose."*

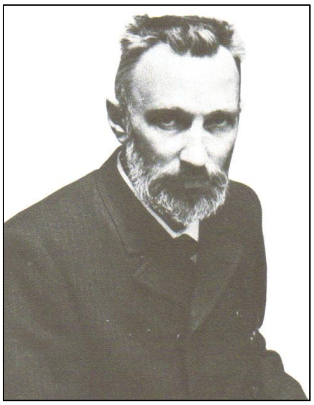
Even before Wells's work, Bertrand Russell had reportedly written an unpublished short story in 1902 about a bomb that was capable of destroying all mankind. The British Empire and its toadies were banging their drums to instill fear in the minds of the people.

As usual, many of the media echoed their scenarios. Here's one example from *The St. Louis Post-Dispatch*, which previewed the upcoming International Electrical Congress in St. Louis. They announced that *"a grain of the most wonderful and mysterious metal will be shown in St. Louis in 1904. … Its power will be inconceivable. By means of the metal all the arsenals of the world would be destroyed. … It is even possible that an instrument might be invented which at the touch of a key would blow up the whole earth and bring about the end of the world."*

Pierre Curie understood that some people in the establishment had a sinister agenda. In his Nobel Prize lecture in Sweden in June 1905, he warned:

"One may also imagine that in criminal hands radium might become dangerous, and here we may ask ourselves if humanity has anything to gain by learning the secrets of nature, if it is ripe enough to profit by them, or if this knowledge is not harmful. One example of Nobel's discoveries is characteristic: powerful explosives have permitted men to perform admirable work. They are also a terrible means of destruction in the hands of the great criminals who lead the peoples toward war. I am among those who think, with Nobel, that humanity will obtain more good than evil from the new discoveries."

The Death of Pierre
April 19th, 1906:
Alone and Pierre's Death



In the same spirit as Prometheus when he gave the gift of fire to mankind, the Curies brought to the world a new form of fire—a discovery which would create new capabilities for increasing the energy flux density available for human progress. Vernadsky observed: *"Soon man will have atomic power in his hands. This is a power source which will give him the possibility to build his life as he wishes. Will he be able to use this force for good purposes and not self-destruction?"*

Tragically, right at the dawn of this new era for mankind, on April 19th, 1906, on *that* dreadful day, Pierre Curie died in a road accident. It was a shock that not only ricocheted throughout the world, but one that left Marie alone and devastated. Eve, her daughter, wrote in her biography of Marie, that after some weeks had passed: *"Marie, incapable of speaking of her woe before human beings, lost in silence, a desert which sometimes made her cry out with horror, was to open a grey notebook and hurl onto paper… the thoughts that were stifling her. Through these scratchy, tear-splotched pages, of which only fragments can be published, she addressed Pierre, called upon him and asked him questions. She tried to fix every detail of the drama which had separated them in order to torture herself with it forever afterward. The brief, intimate diary – the first and the only one Marie ever kept – reflected the most tragic hours of this great woman's life."*

However, Pierre's brother Jacques, and Marie's sister Bronya and brother Joseph, who were worried about the financial security for Marie and the children, organized behind the scenes for one of two options. One was for Marie to receive a pension, which the government agreed to officially propose a national pension to be awarded to Marie and the children. The other was to arrange with the Sorbonne University to offer Marie the professorship of Pierre's, to run his laboratory and continue his work, which Jacques saw as important. Before doing so, he put the ideas to Marie. When asked about Sorbonne University, Marie was vague and that she did not know, but on the pension which I believe possibly snapped her out of deep depression that was a different story. And as Eve (Marie's other daughter) wrote, "it was a faint echo of her habitual bravery when Marie flatly refused and said, *'I don't want a pension. I am young enough to earn my own living and that of my children'".*

Jacques and Bronya, along with a friend of Pierre's, Georges Gouy, went to the Sorbonne University and stated their conviction to the dean of the faculty of science. They made it clear that Marie was the only French physicist capable of pursuing the work she and Pierre had undertaken, and that Marie was the only teacher worthy of succeeding Pierre. Traditions and customs must be swept away, they declared.